CLAIMS

What is claimed is:

1. A PTH analogue or a truncated PTH analogue or a pharmaceutically acceptable salt thereof that selectively binds to the PTH2 receptor.

2. A PTH analogue or a truncated PTH analogue or a pharmaceutically acceptable salt thereof according to claim 1 where said analogue is a selective PTH2 receptor agonist.

3. A PTH analogue or a truncated PTH analogue or a pharmaceutically acceptable salt thereof according to claim 1 where said analogue is a selective PTH2 receptor antagonist.

4. A method of selectively binding a PTH2 receptor which comprises administering to a patient in need thereof an effective amount of an analogue according to claim 1 or a pharmaceutically-acceptable salt thereof.

5. A method of selectively eliciting an agonist response from the PTH2 receptor which comprises administering to a patient in need thereof an effective amount of an analogue according to claim 2 or a pharmaceutically acceptable salt thereof.

6. A method of selectively eliciting an antagonist response from the PTH2 receptor which comprises administering to a patient in need thereof an effective amount of an analogue according to claim 3 or a pharmaceutically acceptable salt thereof.

7. An analogue according to claim 1 wherein said analogue is of formula (I),

(R^1R^2)-A^1-A^2-A^3-A^4-A^5-A^6-A^7-A^8-A^9-A^{10}-A^{11}-A^{12}-A^{13}-A^{14}-A^{15}-A^{16}-A^{17}-A^{18}-A^{19}-A^{20}-A^{21}-A^{22}-A^{23}-A^{24}-A^{25}-A^{26}-A^{27}-A^{28}-A^{29}-A^{30}-A^{31}-A^{32}-A^{33}-A^{34}-A^{35}-A^{36}-A^{37}-A^{38}-R^3 ,

(I)

or a pharmaceutically-acceptable salt thereof wherein

A^1 is a hydrophilic or a lipophilic amino acid;

A^2 is a lipophilic amino acid;

A^3 is a hydrophilic or a lipophilic amino acid;

A^4 is a hydrophilic amino acid;

A^5 is a hydrophilic or a lipophilic amino acid;

A^6 is a hydrophilic amino acid or is deleted;

A^7 is a hydrophilic or a lipophilic amino acid or is deleted;

A^8 is a lipophilic amino acid or is deleted;

A^9 is a hydrophilic amino acid or is deleted;

A^{10} is a hydrophilic amino acid or is deleted;

A^{11} is a hydrophilic or a lipophilic amino acid or is deleted;

A^{12} is a hydrophilic or a lipophilic amino acid or is deleted;

A^{13} is a hydrophilic amino acid;

A^{14} is a hydrophilic amino acid or is deleted;

A^{15} is a lipophilic amino acid or is deleted;

A^{16} is a hydrophilic or a lipophilic amino acid or is deleted;

A^{17} is a hydrophilic or a lipophilic amino acid or is deleted;

A^{18} is a lipophilic amino acid or is deleted;

A^{19} is a hydrophilic or a lipophilic amino acid or is deleted;

A^{20} is a hydrophilic amino acid or is deleted;

A^{21} is a hydrophilic or a lipophilic amino acid or is deleted;

A^{22} is a lipophilic or a hydrophilic amino acid or is deleted;

A^{23} is a hydrophilic or a lipophilic amino acid;

A^{24} is a hydrophilic or a lipophilic amino acid;

A^{25} is a hydrophilic amino acid;

A^{26} is a hydrophilic amino acid;

A^{27} is a lipophilic or a hydrophilic amino acid;

A^{28} is a lipophilic amino acid;

A^{29} is a lipophilic or a hydrophilic amino acid;

A^{30} is a hydrophilic or a lipophilic amino acid;

A^{31} is a lipophilic or a hydrophilic amino acid or is deleted;

A^{32} is a hydrophilic amino acid or is deleted;

A^{33} is a hydrophilic amino acid or is deleted;

A^{34} is a lipophilic amino acid or is deleted;

A^{35} is a lipophilic amino acid or is deleted;

A^{36} is a lipophilic or a hydrophilic amino acid or is deleted;

A^{37} is a lipophilic amino acid or is deleted;

A^{38} is a lipophilic or a hydrophilic amino acid or is deleted;

R^1 and R^2 are each independently selected from the group consisting of H, (C_{1-30})alkyl, (C_{2-30})alkenyl, phenyl-(C_{1-30})alkyl, naphthyl(C_{1-30})alkyl, hydroxy(C_{1-30})alkyl, hydroxy(C_{2-30})alkenyl, hydroxy-phenyl(C_{1-30})alkyl or hydroxy-naphthyl(C_{1-30})alkyl;

or one of R^1 or R^2 is COE^1 where E^1 is (C_{1-30})alkyl, (C_{2-30})alkenyl, phenyl(C_{1-30})alkyl, naphthyl(C_{1-30})alkyl, hydroxy(C_{1-30})alkyl, hydroxy(C_{2-30})alkenyl, hydroxy-phenyl(C_{1-30})alkyl or hydroxy-naphthyl(C_{1-30})alkyl; and

R^3 is OH, NH_2, (C_{1-30})alkoxy or NH-Y-CH_2-Z, where Y is a (C_{1-30}) hydrocarbon moiety and Z is CO_2H or $CONH_2$;

provided that the ~~compound~~ analogue is not PTH(1-34)R^3, PTH(1-35)R^3, PTH(1-36)R^3, PTH(1-37)R^3, or PTH(1-38)R^3.

8. A method of selectively binding a PTH2 receptor which comprises administering to a patient in need thereof an effective amount of an analogue according to claim 7 or a pharmaceutically-acceptable salt thereof.

9. An analogue according to claim 1 of formula (II),

(R^1R^2)-A^1-A^2-A^3-A^4-A^5-A^6-A^7-A^8-A^9-A^{10}-A^{11}-A^{12}-A^{13}-A^{14}-A^{15}-A^{16}-A^{17}-A^{18}-A^{19}-A^{20}-A^{21}-A^{22}-A^{23}-A^{24}-A^{25}-A^{26}-A^{27}-A^{28}-A^{29}-A^{30}-A^{31}-A^{32}-A^{33}-A^{34}-A^{35}-A^{36}-A^{37}-A^{38}-R^3,

(II)

or a pharmaceutically-acceptable salt thereof wherein

A^1 is Ser, Ala, Dap, Thr, Aib or is deleted;

A^2 is Val, Leu, Ile, Phe, Nle, β-Nal, Aib, p-X-Phe, Acc, Cha, Met or is deleted;

A^3 is Ser, Thr, Aib or is deleted;

A^4 is Glu, Asp or is deleted;

A^5 is Leu, Val, Nle, Ile, Cha, β-Nal, Trp, Pal, Acc, Phe, p-X-Phe or is deleted;

A^6 is Gln, a hydrophilic amino acid or is deleted;

A^7 is Leu, Val, Nle, Ile, Cha, β-Nal, Trp, Pal, Acc, Phe, p-X-Phe, a lipophilic amino acid, or is deleted;

A^8 is Met, Nva, Leu, Val, Ile, Cha, Acc, Nle, p-X-Phe, Phe, β-Nal, Bpa, a lipophilic amino acid or is deleted;

A^9 is His, a hydrophilic amino acid or is deleted;

A^{10} is Asn, a hydrophilic amino acid or is deleted;

A^{11} is Leu, Val, Nle, Ile, Cha, β-Nal, Trp, Pal, Acc, Phe, p-X-Phe, a hydrophilic amino acid or is deleted;

A^{12} is Gly, Acc, Aib, or is deleted;

A^{13} is Lys, Arg or HN-CH($(CH_2)_n$NH-R^4)-C(O);

A^{14} is His or is deleted;

A^{15} is Leu, Val, Nle, Ile, Cha, β-Nal, Trp, Pal, Acc, Phe, p-X-Phe or is deleted;

A^{16} is Ser, Asn, Ala, Aib or is deleted;

A^{17} is Ser, Thr, Aib or is deleted;

A^{18} is Met, Nva, Leu, Val, Ile, Nle, p-X-Phe, Phe, β-Nal, Acc, Cha, Aib or is deleted;

A^{19} is Glu, Aib or is deleted;

A^{20} is Arg, Lys, HN-CH($(CH_2)_n$NH-R^4)-C(O) or is deleted;

A^{21} is Val, Leu, Ile, Phe, Nle, β-Nal, Aib, p-X-Phe, Acc, Cha, Met or is deleted;

A^{22} is Acc, Aib, Glu or is deleted;

A^{23} is Trp, Acc, Phe, p-X-Phe, Aib, β-Nal or Cha;

A^{24} is Leu, Acc, Ile, Val, Phe, β-Nal, Nle, Aib, p-X-Phe or Cha;

A^{25} is Arg, Lys or HN-CH($(CH_2)_n$NH-R^4)-C(O);

A^{26} is Arg, Lys or HN-CH($(CH_2)_n$NH-R^4)-C(O);

A^{27} is Lys, Aib, Leu, hArg, Gln, Acc, Arg, Cha, Nle, Ile, Val, Phe, β-Nal, or p-X-Phe, where the Lys is optionally substituted on the ε-amino group by an acyl group;

A^{28} is Leu, Acc, Cha, Ile, Val, Phe, Nle, β-Nal, Aib or p-X-Phe;

A^{29} is Gln, Acc or Aib;

A^{30} is Asp, Lys, Arg or is deleted;

A^{31} is Val, Leu, Nle, Acc, Cha, Phe, Ile, β-Nal, Aib, p-X-Phe or is deleted;

A^{32} is His or is deleted;

A^{33} is Asn or is deleted;

A^{34} is Phe, Tyr, Amp, Aib, β-Nal, Cha, Nle, Leu, Ile, Acc, p-X-Phe or is deleted;

A^{35} is Val, Leu, Nle, Acc, Cha, Phe, Ile, β-Nal, Aib, p-X-Phe or is deleted;

A^{36} is Ala, Val, Aib, Acc, Nva, Abu or is deleted;

A^{37} is Leu, Val, Nle, Ile, Cha, β-Nal, Trp, Pal, Acc, Phe, p-X-Phe, a lipophilic amino acid, or is deleted;

A^{38} is Gly, Acc, Aib, or is deleted;

where X for each occurrence is independently selected from the group consisting of OH, a halo and CH_3;

R^1 and R^2 are each independently selected from the group consisting of H, (C_{1-30})alkyl, (C_{2-30})alkenyl, phenyl-(C_{1-30})alkyl, naphthyl(C_{1-30})alkyl, hydroxy(C_{1-30})alkyl, hydroxy(C_{2-30})alkenyl, hydroxy-phenyl(C_{1-30})alkyl or hydroxy-naphthyl(C_{1-30})alkyl;

or one of R^1 or R^2 is COE^1 where E^1 is (C_{1-30})alkyl, (C_{2-30})alkenyl, phenyl(C_{1-30})alkyl, naphthyl(C_{1-30})alkyl, hydroxy(C_{1-30})alkyl, hydroxy(C_{2-30})alkenyl, hydroxy-phenyl(C_{1-30})alkyl or hydroxy-naphthyl(C_{1-30})alkyl;

R^3 is OH, NH_2, (C_{1-30})alkoxy or NH-Y-CH_2-Z, where Y is a (C_{1-30}) hydrocarbon moiety and Z is CO_2H or $CONH_2$;

n for each occurrence is independently an integer from 1 to 5; and

R^4 for each occurrence is independently $(C_1$-$C_{30})$alkyl, $(C_1$-$C_{30})$acyl or -C((NH)(NH_2));

provided that the ~~compound~~ analogue is not PTH(1-34)R^3, PTH(1-35)R^3, PTH(1-36)R^3, PTH(1-37)R^3, or PTH(1-38)R^3.

10. A compound of the formula (III),

(R^1R^2)-A^1-A^2-A^3-A^4-A^5-A^6-A^7-A^8-A^9-A^{10}-A^{11}-A^{12}-A^{13}-A^{14}-A^{15}-A^{16}-A^{17}-A^{18}-A^{19}-A^{20}-A^{21}-A^{22}-A^{23}-A^{24}-A^{25}-A^{26}-A^{27}-A^{28}-A^{29}-A^{30}-A^{31}-A^{32}-A^{33}-A^{34}-A^{35}-A^{36}-A^{37}-A^{38}-R^3,

(III)

or a pharmaceutically-acceptable salt thereof wherein

A^1 is Ser, Ala, Dap, Thr, Aib or is deleted;

A^2 is Val, Leu, Ile, Phe, Nle, β-Nal, Aib, p-X-Phe, Acc, Cha, Met or is deleted;

A^3 is Ser, Thr, Aib or is deleted;

A^4 is Glu, Asp or is deleted;

A^5 is Leu, Val, Nle, Ile, Cha, β-Nal, Trp, Pal, Acc, Phe, p-X-Phe or is deleted;

A^6 is Gln, a hydrophilic amino acid or is deleted;

A^7 is Leu, Val, Nle, Ile, Cha, β-Nal, Trp, Pal, Acc, Phe, p-X-Phe, a lipophilic amino acid, or is deleted;

A^8 is Met, Nva, Leu, Val, Ile, Cha, Acc, Nle, p-X-Phe, Phe, β-Nal, Bpa, a lipophilic amino acid or is deleted;

A^9 is His, a hydrophilic amino acid or is deleted;

A^{10} is Asn, a hydrophilic amino acid or is deleted;

A^{11} is Leu, Val, Nle, Ile, Cha, β-Nal, Trp, Pal, Acc, Phe, p-X-Phe, a hydrophilic amino acid or is deleted;

A^{12} is Gly, Acc, Aib, or is deleted;

A^{13} is Lys, Arg, or HN-CH((CH$_2$)$_n$NH-R^4)-C(O); deleted

A^{14} is His or is deleted;

A^{15} is Leu, Val, Nle, Ile, Cha, β-Nal, Trp, Pal, Acc, Phe, p-X-Phe or is deleted;

A^{16} is Ser, Asn, Ala, Aib or is deleted;

A^{17} is Ser, Thr, Aib or is deleted;

A^{18} is Met, Nva, Leu, Val, Ile, Nle, p-X-Phe, Phe, β-Nal, Acc, Cha, Aib or is deleted;

A^{19} is Glu, Aib or is deleted;

A^{20} is Arg, Lys, HN-CH($(CH_2)_n$NH-R^4)-C(O) or is deleted;

A^{21} is Val, Leu, Ile, Phe, Nle, β-Nal, Aib, p-X-Phe, Acc, Cha, Met or is deleted;

A^{22} is Acc, Aib, Glu or is deleted;

A^{23} is Trp, Acc, Phe, p-X-Phe, Aib, β-Nal or Cha;

A^{24} is Leu, Acc, Ile, Val, Phe, β-Nal, Nle, Aib, p-X-Phe or Cha;

A^{25} is Arg, Lys or HN-CH($(CH_2)_n$NH-R^4)-C(O);

A^{26} is Arg, Lys or HN-CH($(CH_2)_n$NH-R^4)-C(O);

A^{27} is Lys, Aib, Leu, hArg, Gln, Acc, Arg, Cha, Nle, Ile, Val, Phe, β-Nal, or p-X-Phe, where the Lys is optionally substituted on the ε-amino group by an acyl group;

A^{28} is Leu, Acc, Cha, Ile, Val, Phe, Nle, β-Nal, Aib or p-X-Phe;

A^{29} is Gln, Acc or Aib;

A^{30} is Asp, Lys, Arg or is deleted;

A^{31} is Val, Leu, Nle, Acc, Cha, Phe, Ile, β-Nal, Aib, p-X-Phe or is deleted;

A^{32} is His or is deleted;

A^{33} is Asn or is deleted;

A^{34} is Phe, Tyr, Amp, Aib, β-Nal, Cha, Nle, Leu, Ile, Acc, p-X-Phe or is deleted;

A^{35} is Val, Leu, Nle, Acc, Cha, Phe, Ile, β-Nal, Aib, p-X-Phe or is deleted;

A^{36} is Ala, Val, Aib, Acc, Nva, Abu or is deleted;

A^{37} is Leu, Val, Nle, Ile, Cha, β-Nal, Trp, Pal, Acc, Phe, p-X-Phe, a lipophilic amino acid, or is deleted;

A^{38} is Gly, Acc, Aib, or is deleted;

where X for each occurrence is independently selected from the group consisting of OH, a halo and CH_3;

R^1 and R^2 are each independently selected from the group consisting of H, (C_{1-30})alkyl, (C_{2-30})alkenyl, phenyl-(C_{1-30})alkyl, naphthyl(C_{1-30})alkyl, hydroxy(C_{1-30})alkyl, hydroxy(C_{2-30})alkenyl, hydroxy-phenyl(C_{1-30})alkyl and hydroxy-naphthyl(C_{1-30})alkyl;

or one of R^1 or R^2 is COE^1 where E^1 is (C_{1-30})alkyl, (C_{2-30})alkenyl, phenyl(C_{1-30})alkyl, naphthyl(C_{1-30})alkyl, hydroxy(C_{1-30})alkyl, hydroxy(C_{2-30})alkenyl, hydroxy-phenyl(C_{1-30})alkyl or hydroxy-naphthyl(C_{1-30})alkyl;

R^3 is OH, NH_2, (C_{1-30})alkoxy or NH-Y-CH_2-Z, where Y is a (C_{1-30}) hydrocarbon moiety and Z is CO_2H or $CONH_2$;

n for each occurrence is independently an integer from 1 to 5; and

R^4 for each occurrence is independently $(C_1$-$C_{30})$alkyl, $(C_1$-$C_{30})$acyl or -C((NH)(NH_2));

provided that when A^8 is not a lipophilic D-amino acid or is not deleted then at least one of A^6, A^7, A^9, A^{10}, A^{11} and A^{12} is a D-amino acid or at least one of A^6, A^7, A^9, A^{10}, A^{11}, A^{12}, A^{13}, A^{14}, A^{15}, A^{16}, A^{17}, A^{18}, A^{19}, A^{20}, A^{21} and A^{22} is deleted;

and further provided that when the compound contains a D-amino acid then A^{36} is deleted.

11. A compound according to claim 10 wherein said compound is

[D-Nle^8, Nle^{18}, Tyr^{34}]hPTH(1-34)NH_2,

[D-Nle^8]hPTH(1-34)NH_2,

[D-Leu^8, Nle^{18}, Tyr^{34}]hPTH(1-34)NH_2,

[D-Cha^8, Nle^{18}, Tyr^{34}]hPTH(1-34)NH_2,

[D-Phe^8, Nle^{18}, Tyr^{34}]hPTH(1-34)NH_2,

[D-Nal^8, Nle^{18}, Tyr^{34}]hPTH(1-34)NH_2,

[D-Abu^8, Nle^{18}, Tyr^{34}]hPTH(1-34)NH_2,

[D-Met^8]hPTH(1-34)NH_2,

[Cha^{7,11}, D-Met^8]hPTH(1-34)NH_2,

[D-Ile^8]hPTH(1-34)NH_2,

[Cha^{7,11}, D-Ile^8, Nle^{18}, Tyr^{34}]hPTH(1-34)NH_2,

[D-Ile^8, Nle^{18}, Tyr^{34}]hPTH(1-34)NH_2,

[D-Leu^8]hPTH(1-34)NH_2,

[Cha^{7,11}, D-Leu^8, Nle^{18}, Tyr^{34}]hPTH(1-34)NH_2,

[D-Val^8]hPTH(1-34)NH_2,

[Cha^{7,11}, D-Val^8, Nle^{18}, Tyr^{34}]hPTH(1-34)NH_2,

[D-Val^8, Nle^{18}, Tyr^{34}]hPTH(1-34)NH_2,

[D-Cha^8]hPTH(1-34)NH_2,

[Cha^{7,11}, D-Cha^8, Nle^{18}, Tyr^{34}]hPTH(1-34)NH_2,

[D-Ala^8]hPTH(1-34)NH_2,

[Cha^{7,11}, D-Ala^8, Nle^{18}, Tyr^{34}]hPTH(1-34)NH_2,

[D-Ala^{8}, Nle^{18}, Tyr^{34}]hPTH(1-34)NH_2,

[D-Phe^{8}]hPTH(1-34)NH_2,

[Cha^{7,11}, D-Phe^{8}, Nle^{18}, Tyr^{34}]hPTH(1-34)NH_2,

[D-Nal^{8}]hPTH(1-34)NH_2,

[D-Trp^{8}]hPTH(1-34)NH_2,

[Cha^{7,11}, D-Trp^{8}, Nle^{18}, Tyr^{34}]hPTH(1-34)NH_2,

[D-Trp^{8}, Nle^{18}, Tyr^{34}]hPTH(1-34)NH_2,

[D-Abu^{8}]hPTH(1-34)NH_2,

[Cha^{7,11}, D-Abu^{8}, Nle^{18}, Tyr^{34}]hPTH(1-34)NH_2,

[D-Nle^{8}, Nle^{18}]hPTH(1-34)NH_2,

[des-Met^{8}]hPTH(1-34)NH_2,

[Cha^{7,11}, des-Met^{8}]hPTH(1-34)NH_2,

[Cha^{7,11}, des-Met^{8}, des-Met^{18}, Tyr^{34}]hPTH(1-34)NH_2,

[des-Met^{8}, des-Met^{18}]hPTH(1-34)NH_2,

[Cha^{7,11}, des-Met^{8}, des-Met^{18}]hPTH(1-34)NH_2,

[des-Met^{8}, Nle^{18}, Tyr^{34}]hPTH(1-34)NH_2,

[des-Met^{18}]hPTH(1-34)NH_2,

[Cha^{7,11}, des-Met^{18}]hPTH(1-34)NH_2,

[Cha^{7,11}, des-Met^{18}, Tyr^{34}]hPTH(1-34)NH_2,

[D-Nle^{8}, des-Met^{18}, Tyr^{34}]hPTH(1-34)NH_2,

[des-Glu^{6}, Nle^{8,18}, Tyr^{34}]hPTH(1-34)NH_2,

[des-Leu^{7}, Nle^{8,18}, Tyr^{34}]hPTH(1-34)NH_2,

[des-His^{9}, Nle^{8,18}, Tyr^{34}]hPTH(1-34)NH_2,

[des-Asn^{10}, Nle^{8,18}, Tyr^{34}]hPTH(1-34)NH_2,

[des-Leu^{11}, Nle^{8,18}, Tyr^{34}]hPTH(1-34)NH_2,

[des-Gly^{12}, Nle^{8,18}, Tyr^{34}]hPTH(1-34)NH_2,

[des-Lys^{13}, Nle^{8,18}, Tyr^{34}]hPTH(1-34)NH_2,

[des-His^{14}, Nle^{8,18}, Tyr^{34}]hPTH(1-34)NH_2,

[des-Leu^{15}, Nle^{8,18}, Tyr^{34}]hPTH(1-34)NH_2,

[des-Asn^{16}, Nle^{8,18}, Tyr^{34}]hPTH(1-34)NH_2,

[des-Ser^{17}, Nle^{8,18}, Tyr^{34}]hPTH(1-34)NH_2,

[des-Glu^{19}, Nle^{8,18}, Tyr^{34}]hPTH(1-34)NH_2,

[des-Arg^{20}, Nle^{8,18}, Tyr^{34}]hPTH(1-34)NH_2,

[des-Val^{21}, Nle^{8,18}, Tyr^{34}]hPTH(1-34)NH$_2$,

[des-Glu^{22}, Nle ^{8,18}, Tyr^{34}]hPTH(1-34)NH$_2$,

[des-Gln^{6}, Cha^{7,11}, Nle^{8,18}, Tyr^{34}]hPTH(1-34)NH$_2$,

[des-Leu^{7}, Nle^{8,18}, Cha^{11}, Tyr^{34}]hPTH(1-34)NH$_2$,

[Cha^{7,11}, des-His^{9}, Nle^{8,18}, Tyr^{34}]hPTH(1-34)NH$_2$,

[des-Gln^{6}, Cha^{7,11}, D-Nle^{8}, Nle^{18}, Tyr^{34}]hPTH(1-34)NH$_2$,

[des-Leu^{7}, D-Nle^{8}, Cha^{11}, Nle^{18}, Tyr^{34}]hPTH(1-34)NH$_2$,

[Cha^{7,11}, D-Nle^{8}, des-His^{9}, Nle^{18}, Tyr^{34}]hPTH(1-34)NH$_2$,

[Cha^{7,11}, D-Nle^{8}, Nle^{18}, Tyr^{34}]hPTH(1-31)NH$_2$,

[Cha^{7,11}, des-Met^{8}, Nle^{18}, Tyr^{34}]hPTH(1-34)NH$_2$,

[Cha^{7,11}, D-Nle^{8}, des-Met^{18}, Tyr^{34}]hPTH(1-34)NH$_2$,

[Cha^{7,11}, des-Met^{8}, des-His^{9}, des-Asn^{10}]hPTH(1-34)NH$_2$,

[Cha^{7,11}, des-Ser^{17}, des-Met^{18}, des-Glu^{19}]hPTH(1-34)NH$_2$,

[D-Met^{8}, Nle^{18}, Tyr^{34}]hPTH(1-34)NH$_2$,

[D-Met^{8}, Tyr^{34}]hPTH(1-34)NH$_2$,

[D-Bpa^{8}, Tyr^{34}]hPTH(1-34)NH$_2$,

[D-Nle^{8}, Nle^{18}, Tyr^{34}]hPTH(7-34)NH$_2$,

[D-Nle^{8}, Nle^{18}]hPTH(7-34)NH$_2$ or

[D-Met^{8}]hPTH(7-34)NH$_2$.

12. A compound according to claim 11 wherein said compound is

[Cha^{7,11}, des-Met^{8}, Nle^{18}, Tyr^{34}]hPTH-(1-34)NH$_2$,

[Cha^{7,11}, D-Nle^{8}, des-Met^{18}, Tyr^{34}]hPTH-(1-34)NH$_2$,

[Cha^{7,11}, D-Nle^{8}, Nle^{18}, Tyr^{34}]hPTH-(1-34)NH$_2$,

[D-Nle^{8}, Nle^{18}, Tyr^{34}]hPTH(1-34)NH$_2$ or [D-Bpa^{8}, Tyr^{34}]hPTH(1-34)NH$_2$.

13. A PTHrP analogue of formula (IV) that selectively binds to the PTH2 receptor,

(R^{1}R^2)-A^1-A^2-A^3-A^4-A^5-A^6-A^7-A^8-A^9-A^{10}-A^{11}-A^{12}-A^{13}-A^{14}-A^{15}-A^{16}-A^{17}-A^{18}-A^{19}-A^{20}-A^{21}-A^{22}-A^{23}-A^{24}-A^{25}-A^{26}-A^{27}-A^{28}-A^{29}-A^{30}-A^{31}-A^{32}-A^{33}-A^{34}-A^{35}-A^{36}-A^{37}-A^{38}-R^3,

(IV)

or a pharmaceutically acceptable salt thereof, wherein

A^1 is Ala, Ser, Dap, Thr, Aib or is deleted;

A^2 is Val or is deleted;

A^3 is Ser, Aib, Thr or is deleted;

A^4 is Glu, Asp or is deleted;

A^5 is His, Ile, Acc, Val, Nle, Phe, Leu, p-X-Phe, β-Nal, Aib, Cha or is deleted;

A^6 is Gln, a hydrophilic amino acid or is deleted;

A^7 is Leu, Val, Cha, Nle, β-Nal, Trp, Pal, Acc, Phe, p-X-Phe, Aib, a lipophilic amino acid or is deleted;

A^8 is Leu, Met, Acc, Cha, Aib, Nle, Phe, Ile, Val, β-Nal, p-X-Phe, a lipophilic amino acid or is deleted;

A^9 is His, a hydrophilic amino acid or is deleted;

A^{10} is Asp, Asn, a hydrophilic amino acid or is deleted;

A^{11} is Lys, Arg, Leu, Cha, Aib, p-X-Phe, Ile, Val, Nle, Acc, Phe, β-Nal, HN-CH($(CH_2)_n$NH-R^4)-C(O), a lipophilic D-amino acid, a hydrophilic amino acid or is deleted;

A^{12} is Gly, Acc, Aib or is deleted;

A^{13} is Lys, Arg, HN-CH($(CH_2)_n$NH-R^4)-C(O) or is deleted;

A^{14} is Ser, His or is deleted;

A^{15} is Ile, Acc, Cha, Leu, Phe, Nle, β-Nal, Trp, p-X-Phe, Val, Aib or is deleted;

A^{16} is Gln, Aib or is deleted;

A^{17} is Asp, Aib or is deleted;

A^{18} is Leu, Aib, Acc, Cha, Phe, Ile, Nle, β-Nal, Val, p-X-Phe or is deleted;

A^{19} is Arg, Lys, Aib, HN-CH($(CH_2)_n$NH-R^4)-C(O) or is deleted;

A^{20} is Arg, Lys, HN-CH($(CH_2)_n$NH-R^4)-C(O) or is deleted;

A^{21} is Arg, Lys, HN-CH($(CH_2)_n$NH-R^4)-C(O) or is deleted;

A^{22} is Phe, Glu, Aib, Acc, p-X-Phe, β-Nal, Val, Leu, Ile, Nle or Cha;

A^{23} is Phe, Leu, Lys, Acc, Cha, β-Nal, Aib, Nle, Ile, p-X-Phe, Val or Trp;

A^{24} is Leu, Lys, Acc, Nle, Ile, Val, Phe, β-Nal, Aib, p-X-Phe, Arg or Cha;

A^{25} is His, Lys, Aib, Acc, Arg or Glu;

A^{26} is His, Aib, Acc, Arg or Lys;

A^{27} is Leu, Lys, Acc, Arg, Ile, Val, Phe, Aib, Nle, β-Nal, p-X-Phe or Cha;

A^{28} is Ile, Leu, Lys, Acc, Cha, Val, Phe, p-X-Phe, Nle, β-Nal, Aib or is deleted;

A^{29} is Ala, Glu, Acc, Aib or is deleted;

A^{30} is Glu, Leu, Nle, Cha, Aib, Acc, Lys, Arg or is deleted;

A^{31} is Ile, Leu, Cha, Lys, Acc, Phe, Val, Nle, β-Nal, Arg or is deleted;

A^{32} is His or is deleted;

A^{33} is Thr, Ser or is deleted;

A^{34} is Ala, Phe, Tyr, Cha, Val, Ile, Leu, Nle, β-Nal, Aib, Acc or is deleted;

A^{35} is Glu, Asp or is deleted;

A^{36} is Ile, Acc, Cha, Leu, Phe, Nle, β-Nal, Trp, p-X-Phe, Val, Aib or is deleted;

A^{37} is Arg, Lys, HN-CH($(CH_2)_n$NH-R^4)-C(O) or is deleted;

A^{38} is Ala, Phe, Tyr, Cha, Val, Ile, Leu, Nle, β-Nal, Aib, Acc or is deleted;

R^1 and R^2 are each independently selected from the group consisting of H, (C_{1-30})alkyl, (C_{2-30})alkenyl, phenyl-(C_{1-30})alkyl, naphthyl(C_{1-30})alkyl, hydroxy(C_{1-30})alkyl, hydroxy(C_{2-30})alkenyl, hydroxy-phenyl(C_{1-30})alkyl or hydroxy-naphthyl(C_{1-30})alkyl;

or one of R^1 or R^2 is COE^1 where E^1 is (C_{1-30})alkyl, (C_{2-30})alkenyl, phenyl(C_{1-30})alkyl, naphthyl(C_{1-30})alkyl, hydroxy(C_{1-30})alkyl, hydroxy(C_{2-30})alkenyl, hydroxy-phenyl(C_{1-30})alkyl and hydroxy-naphthyl(C_{1-30})alkyl;

R^3 is OH, NH_2, (C_{1-30})alkoxy or NH-Y-CH_2-Z, where Y is a (C_{1-30}) hydrocarbon moiety and Z is CO_2H or $CONH_2$;

n for each occurrence is independently an integer from 1 to 5; and

R^4 for each occurrence is independently (C_1-C_{30})alkyl, (C_1-C_{30})acyl or -C((NH)(NH_2));

provided that the analogue is not PTHrP(1-34)R^3, PTHrP(1-35)R^3, PTHrP(1-36)R^3, PTHrP(1-37)R^3 or PTHrP(1-38)R^3,

and further provided that the compound is not [Ile^5, Trp^{23}]PTHrP(1-36) or [Trp^{23}]PTHrP(1-36).

14. A compound of formula (V),

(R^1R^2)-A^1-A^2-A^3-A^4-A^5-A^6-A^7-A^8-A^9-A^{10}-A^{11}-A^{12}-A^{13}-A^{14}-A^{15}-A^{16}-A^{17}-A^{18}-A^{19}-A^{20}-A^{21}-A^{22}-A^{23}-A^{24}-A^{25}-A^{26}-A^{27}-A^{28}-A^{29}-A^{30}-A^{31}-A^{32}-A^{33}-A^{34}-A^{35}-A^{36}-A^{37}-A^{38}-R^3,

(V)

or a pharmaceutically acceptable salt thereof, wherein

A^1 is Ala, Ser, Dap, Thr, Aib or is deleted;

A^2 is Val or is deleted;

A^3 is Ser, Aib, Thr or is deleted;

A^4 is Glu, Asp or is deleted;

A^5 is His, Ile, Acc, Val, Nle, Phe, Leu, p-X-Phe, β-Nal, Aib, Cha or is deleted;

A^6 is Gln, a hydrophilic amino acid or is deleted;

A^7 is Leu, Val, Cha, Nle, β-Nal, Trp, Pal, Acc, Phe, p-X-Phe, Aib, a lipophilic amino acid or is deleted;

A^8 is Leu, Met, Acc, Cha, Aib, Nle, Phe, Ile, Val, β-Nal, p-X-Phe, a lipophilic amino acid or is deleted;

A^9 is His, a hydrophilic amino acid or is deleted;

A^{10} is Asp, Asn, a hydrophilic amino acid or is deleted;

A^{11} is Lys, Arg, Leu, Cha, Aib, p-X-Phe, Ile, Val, Nle, Acc, Phe, β-Nal, HN-CH($(CH_2)_n$NH-R^4)-C(O), a lipophilic D-amino acid, a hydrophilic amino acid or is deleted;

A^{12} is Gly, Acc, Aib or is deleted;

A^{13} is Lys, Arg, HN-CH($(CH_2)_n$NH-R^4)-C(O) or is deleted;

A^{14} is Ser, His or is deleted;

A^{15} is Ile, Acc, Cha, Leu, Phe, Nle, β-Nal, Trp, p-X-Phe, Val, Aib or is deleted;

A^{16} is Gln, Aib or is deleted;

A^{17} is Asp, Aib or is deleted;

A^{18} is Leu, Aib, Acc, Cha, Phe, Ile, Nle, β-Nal, Val, p-X-Phe or is deleted;

A^{19} is Arg, Lys, Aib, HN-CH($(CH_2)_n$NH-R^4)-C(O) or is deleted;

A^{20} is Arg, Lys, HN-CH($(CH_2)_n$NH-R^4)-C(O) or is deleted;

A^{21} is Arg, Lys, HN-CH($(CH_2)_n$NH-R^4)-C(O) or is deleted;

A^{22} is Phe, Glu, Aib, Acc, p-X-Phe, β-Nal, Val, Leu, Ile, Nle or Cha;

A^{23} is Phe, Leu, Lys, Acc, Cha, β-Nal, Aib, Nle, Ile, p-X-Phe, Val or Trp;

A^{24} is Leu, Lys, Acc, Nle, Ile, Val, Phe, β-Nal, Aib, p-X-Phe, Arg or Cha;

A^{25} is His, Lys, Aib, Acc, Arg or Glu;

A^{26} is His, Aib, Acc, Arg or Lys;

A^{27} is Leu, Lys, Acc, Arg, Ile, Val, Phe, Aib, Nle, β-Nal, p-X-Phe or Cha;

A^{28} is Ile, Leu, Lys, Acc, Cha, Val, Phe, p-X-Phe, Nle, β-Nal, Aib or is deleted;

A^{29} is Ala, Glu, Acc, Aib or is deleted;

A^{30} is Glu, Leu, Nle, Cha, Aib, Acc, Lys, Arg or is deleted;

A^{31} is Ile, Leu, Cha, Lys, Acc, Phe, Val, Nle, β-Nal, Arg or is deleted;

A^{32} is His or is deleted;

A^{33} is Thr, Ser or is deleted;

A^{34} is Ala, Phe, Tyr, Cha, Val, Ile, Leu, Nle, β-Nal, Aib, Acc or is deleted;

A^{35} is Glu, Asp or is deleted;

A^{36} is Ile, Acc, Cha, Leu, Phe, Nle, β-Nal, Trp, p-X-Phe, Val, Aib or is deleted;

A^{37} is Arg, Lys, HN-CH($(CH_2)_n$NH-R^4)-C(O) or is deleted;

A^{38} is Ala, Phe, Tyr, Cha, Val, Ile, Leu, Nle, β-Nal, Aib, Acc or is deleted;

R^1 and R^2 are each independently selected from the group consisting of H, (C_{1-30})alkyl, (C_{2-30})alkenyl, phenyl-(C_{1-30})alkyl, naphthyl(C_{1-30})alkyl, hydroxy(C_{1-30})alkyl, hydroxy(C_{2-30})alkenyl, hydroxy-phenyl(C_{1-30})alkyl or hydroxy-naphthyl(C_{1-30})alkyl;

or one of R^1 or R^2 is COE^1 where E^1 is (C_{1-30})alkyl, (C_{2-30})alkenyl, phenyl(C_{1-30})alkyl, naphthyl(C_{1-30})alkyl, hydroxy(C_{1-30})alkyl, hydroxy(C_{2-30})alkenyl, hydroxy-phenyl(C_{1-30})alkyl and hydroxy-naphthyl(C_{1-30})alkyl;

R^3 is OH, NH_2, (C_{1-30})alkoxy or NH-Y-CH_2-Z, where Y is a (C_{1-30}) hydrocarbon moiety and Z is CO_2H or $CONH_2$;

n for each occurrence is independently an integer from 1 to 5; and

R^4 for each occurrence is independently $(C_1$-$C_{30})$alkyl, $(C_1$-$C_{30})$acyl or -C((NH)(NH_2));

provided that when A^8 is not a lipophilic D-amino acid or is not deleted then at least one of A^6, A^7, A^9, A^{10}, A^{11} and A^{12} is a D-amino acid or at least one of A^6, A^7, A^9, A^{10}, A^{11}, A^{12}, A^{13}, A^{14}, A^{15}, A^{16}, A^{17}, A^{18}, A^{19}, A^{20}, A^{21} and A^{22} is deleted.

15. A compound according to claim 14 wherein said compound is

[Ile^5, D-Leu^8]hPTHrP(1-34)NH_2,

[Ile^5, D-Leu^8, Trp^{23}]hPTHrP(1-34)NH_2,

[Ile^5, des-Leu^8, Trp^{23}]hPTHrP(1-34)NH_2,

[Ile^5, des-Leu^8]hPTHrP(1-34)NH_2,

[des-Leu^8, Trp^{23}]hPTHrP(1-34)NH_2,

[Ile^5, des-Leu^{18}]hPTHrP(1-34)NH_2,

[Ile^5, des-Leu^{18}, Trp^{23}]hPTHrP(1-34)NH_2,

[des-Leu^{18}, Trp^{23}]hPTHrP(1-34)NH_2,

[Ile^5, D-Leu^8, $Glu^{22,25}$, $Leu^{23,28,31}$, $Lys^{26,30}$, Aib^{29}]hPTHrP(1-34)NH_2,

[Ile^5, D-Leu^8, $Glu^{22,25}$, Trp^{23}, $Lys^{26,30}$, $Leu^{28,31}$, Aib^{29}]hPTHrP(1-34)NH_2,

[Ile^5, D-Leu^8, $Glu^{22,25,29}$, $Leu^{23,28,31}$, $Lys^{26,30}$]hPTHrP(1-34)NH_2,

[Ile^5, D-Leu^8, $Glu^{22,25,29}$, Trp^{23}, $Lys^{26,30}$, $Leu^{28,31}$]hPTHrP(1-34)NH_2 or

[D-Leu^8, Trp^{23}]hPTHrP(7-34)NH_2.

16. A method of selectively binding the PTH2 receptor which comprises administering to a patient in need thereof an analogue according to claim 9 or a pharmaceutically acceptable salt thereof.

17. A method of selectively binding the PTH2 receptor which comprises administering to a patient in need thereof a compound according to claim 10 or a pharmaceutically acceptable salt thereof.

18. A method of selectively binding the PTH2 receptor which comprises administering to a patient in need thereof a compound according to claim 11 or a pharmaceutically acceptable salt thereof.

19. A method of selectively binding a PTH2 receptor which comprises administering to a patient in need thereof a compound according to claim 12 or a pharmaceutically acceptable salt thereof.

20. A method of selectively binding a PTH2 receptor which comprises administering to a patient in need thereof an analogue according to claim 13 or a pharmaceutically acceptable salt thereof.

21. A method of selectively binding a PTH2 receptor which comprises administering to a patient in need thereof a compound according to claim 14 or a pharmaceutically acceptable salt thereof.

22. A method of selectively binding a PTH2 receptor which comprises administering to a patient in need thereof a compound according to claim 15 or a pharmaceutically acceptable salt thereof.

23. A pharmaceutical composition comprising an analogue according to claim 9 or a pharmaceutically acceptable salt thereof and a pharmaceutically acceptable carrier.

24. A pharmaceutical composition comprising a compound according to claim 10 or a pharmaceutically acceptable salt thereof and a pharmaceutically acceptable carrier.

25. A pharmaceutical composition comprising a compound according to claim 11 or a pharmaceutically acceptable salt thereof and a pharmaceutically acceptable carrier.

26. A pharmaceutical composition comprising a compound according to claim 12 or a pharmaceutically acceptable salt thereof and a pharmaceutically acceptable carrier.

27. A pharmaceutical composition comprising an analogue according to claim 13 or a pharmaceutically acceptable salt thereof and a pharmaceutically acceptable carrier.

28. A pharmaceutical composition comprising a compound according to claim 14 or a pharmaceutically acceptable salt thereof and a pharmaceutically acceptable carrier.

29. A pharmaceutical composition comprising a compound according to claim 15 or a pharmaceutically acceptable salt thereof and a pharmaceutically acceptable carrier.

30. A method of treating a medical disorder that results from altered or excessive action of the PTH2 receptor, which comprises administering to a patient in need thereof an effective amount of an analogue according to claim 7, sufficient to inhibit the activation of the PTH2 receptor of said patient.

31. A method of treating a medical disorder that results from altered or excessive action of the PTH2 receptor, which comprises administering to a patient in need thereof an effective amount of an analogue according to claim 9, sufficient to inhibit the activation of the PTH2 receptor of said patient.

32. A method of treating a medical disorder that results from altered or excessive action of the PTH2 receptor, which comprises administering to a patient in need thereof an effective amount of a compound according to claim 10, sufficient to inhibit the activation of the PTH2 receptor of said patient.

33. A method of treating a medical disorder that results from altered or excessive action of the PTH2 receptor, which comprises administering to a patient in need thereof an effective amount of a compound according to claim 11, sufficient to inhibit the activation of the PTH2 receptor of said patient.

34. A method of treating a medical disorder that results from altered or excessive action of the PTH2 receptor, which comprises administering to a patient in need thereof an effective amount of a compound according to claim 12, sufficient to inhibit the activation of the PTH2 receptor of said patient.

35. A method of treating a medical disorder that results from altered or excessive action of the PTH2 receptor, which comprises administering to a patient in need thereof an effective amount of an analogue according to claim 13, sufficient to inhibit the activation of the PTH2 receptor of said patient.

36. A method of treating a medical disorder that results from altered or excessive action of the PTH2 receptor, which comprises administering to a patient in need thereof an effective amount of a compound according to claim 14, sufficient to inhibit the activation of the PTH2 receptor of said patient.

37. A method of treating a medical disorder that results from altered or excessive action of the PTH2 receptor, which comprises administering to a patient in need thereof an effective amount of a compound according to claim 15, sufficient to inhibit the activation of the PTH2 receptor of said patient.

38. A method according to claim 30 wherein said medical disorder is abnormal CNS functions, abnormal pancreatic functions, divergence from normal mineral metabolism and homeostasis, male infertility, abnormal blood pressure or a hypothalmic disease.

39. A method according to claim 31 wherein said medical disorder is abnormal CNS functions, abnormal pancreatic functions, divergence from normal mineral metabolism and homeostasis, male infertility, abnormal blood pressure or a hypothalmic disease.

40. A method according to claim 32 wherein said medical disorder is abnormal CNS functions, abnormal pancreatic functions, divergence from normal mineral metabolism and homeostasis, male infertility, abnormal blood pressure or a hypothalmic disease.

41. A method according to claim 33 wherein said medical disorder is abnormal CNS functions, abnormal pancreatic functions, divergence from normal mineral metabolism and homeostasis, male infertility, abnormal blood pressure or a hypothalmic disease.

42. A method according to claim 34 wherein said medical disorder is abnormal CNS functions, abnormal pancreatic functions, divergence from normal mineral metabolism and homeostasis, male infertility, abnormal blood pressure or a hypothalmic disease.

43. A method according to claim 35 wherein said medical disorder is abnormal CNS functions, abnormal pancreatic functions, divergence from normal mineral metabolism and homeostasis, male infertility, abnormal blood pressure or a hypothalmic disease.

44. A method according to claim 36 wherein said medical disorder is abnormal CNS functions, abnormal pancreatic functions, divergence from normal mineral metabolism and homeostasis, male infertility, abnormal blood pressure or a hypothalmic disease.

45. A method according to claim 37 wherein said medical disorder is abnormal CNS functions, abnormal pancreatic functions, divergence from normal mineral metabolism and homeostasis, male infertility, abnormal blood pressure or a hypothalmic disease.

46. A method of treating a medical disorder that results from altered or excessive action of the PTH2 receptor, which comprises administering to a patient in need thereof an effective amount of a PTH analogue or a truncated PTH analogue or a pharmaceutically acceptable salt thereof according to claim 1, sufficient to inhibit the activation of the PTH2 receptor of said patient.

47. A method according to claim 46 wherein said medical disorder is abnormal CNS functions, abnormal pancreatic functions, divergence from normal mineral metabolism and homeostasis, male infertility, abnormal blood pressure or a hypothalmic disease.